1706-3 CONSTRUCTION METHODS

Install backplates for vehicle signal heads so as not to interfere with the function of all door hinges, signal section latches and mounting hardware. Do not bend or deform backplates during installation. Gooseneck fittings may be installed in reverse to accommodate backplates. Use stainless steel fasteners for attaching backplates to signal sections.

1706-4 MEASUREMENT AND PAYMENT

Backplates will be measured and paid in units of each, furnished, installed and accepted. No measurement will be made for different sizes of backplates.

Payment will be made under:

Pay Item	Pay Unit
Backplate	Each

SECTION 1710
MESSENGER CABLE

1710-1 DESCRIPTION

Furnish and install messenger cable (spanwire) with cable clamps, machine bolts, eye bolts, 3-bolt clamps, eye nuts, split-bolt connectors and all necessary hardware.

1710-2 MATERIAL

Refer to Division 10.

Item	Section
Grounding Electrodes	1091-6
Messenger Cable	1098-3
Pole Line Hardware	1098-6
Wire	1091-2

Furnish material, equipment and hardware under this section that is pre-approved on the ITS and Signals QPL.

1710-3 CONSTRUCTION METHODS

Install guy assemblies before installing messenger cable.

Use 3/8" messenger cable for spans supporting vehicle signal heads and/or signs.

Use 1/4" messenger cable for spans supporting only cables unless otherwise specified.

For messenger cable crossing over railroad tracks, provide a minimum of 27 ft of vertical clearance, unless otherwise specified.

For permanent installations, install messenger cable in continuous lengths with no splices except where an insulator is required. With prior approval, existing messenger for temporary installations may be extended instead of installing new messenger cable.

Tension messenger cable to eliminate appreciable sag and to match sag of surrounding utilities. Otherwise, allow 3% to 4% sag of the span length between poles.

For mid-run spans using wood poles, attach messenger cable to the pole with a 3-bolt cable clamp with J-hook consisting of 5/8" diameter machine bolts, J-hooks, washers and square nuts to attach messenger cable to wood poles. Provide machine bolts that are 3" longer than the pole diameter. For mid-run spans using metal or other Department-approved poles, attach messenger cable to the pole with a 3-bolt clamp with J-hook secured to the metal pole via a pole band clamp. Refer to *Metal Pole Standard Drawing* Sheet M6 found on the Department's website.

When terminating spans at wood poles, connect messenger cable to a deadend strandvise attached to the pole via a 5/8" diameter shoulder eye bolt or 5/8" diameter shoulder angle bolt with 5/8" eye nut as shown in *Roadway Standard Drawings* No. 1720.01. When terminating spans at metal or other Department-approved poles, connect messenger cable to a deadend strandvise attached to the pole via a pole attachment clamp. Refer to *Metal Pole Standard Drawing* Sheet M6 as shown in the previous paragraph. Do not install more than one messenger cable and strandvise assembly to a single metal or other Department-approved pole attachment clamp. During installation, ensure that messenger cable is centered and directly aligned at the pole clamp's attachment point such that the cable does not exert forces on the sides of the clamp's attachment point.

Maintain electrical continuity at all splices.

(A) Messenger Cable for Signal Heads or Lead-In Cable

For messenger cable attached to joint use poles, install a new grounding system that complies with Article 1720-3 for bonding messenger cable. If a pole ground exists on the joint use pole, bond new pole grounding system to existing pole ground using #6 AWG minimum solid bare copper grounding wire terminated with split bolt connectors or parallel groove clamp at each end. If existing poles do not have a grounding system, install new grounding system that complies with Article 1720-3.

(B) Messenger Cable for Communications Cable

For messenger cable attached to joint use poles, bond messenger cable to existing pole ground at each end and at 1,300-ft intervals. Install bond using #6 AWG minimum solid bare copper grounding wire terminated with split bolt connectors or parallel groove clamp at each end. If existing poles do not have a grounding system, install new grounding system that complies with Article 1720-3.

(C) Messenger Cable for Multiple Cables

On multiple messenger cable arrangements, connect all messenger cable ends with #6 AWG minimum solid bare copper wire and bond with split bolt connectors or parallel groove clamp and terminate to pole ground.

1710-4 MEASUREMENT AND PAYMENT

Messenger Cable (____) will be measured and paid as actual horizontal linear feet of messenger cable furnished, installed and accepted. Measurement will be point to point with no allowance for sag.

No measurement will be made of cable clamps, machine bolts, eye bolts, 3-bolt assemblies, eye nuts, split bolt connectors and pole grounding systems as these will be incidental to furnishing and installing messenger cable.

Payment will be made under:

Pay Item	Pay Unit
Messenger Cable (____)	Linear Foot

SECTION 1715
UNDERGROUND CABLE INSTALLATION

1715-1 DESCRIPTION

Furnish and install temporary lead-in cable or conduit for underground cable installation with tracer wire, miscellaneous fittings, all necessary hardware, marker tape, backfill, graded stone, paving materials and seeding and mulching.